

## CONNECTIVE TISSUE

### OBJECTIVES:

5. List the general characteristics and functions of connective tissue. (pp. 89 – 90)
6. List, identify, and give the functions of the different types of fibers and cells found in connective tissue. (pp. 90 – 92)
7. Identify and give the functions of the major types of connective tissue. (pp. 91 – 95)
8. Explain how epithelial and connective tissues combine to form four different types of membranes. (pp. 95 – 97)

| GENERAL CHARACTERISTICS: | GENERAL FUNCTIONS: |
|--------------------------|--------------------|
|                          |                    |

| CLASSIFICATION: |             |          |
|-----------------|-------------|----------|
| CATEGORY        | DESCRIPTION | EXAMPLES |
|                 |             |          |
|                 |             |          |
|                 |             |          |

## **PART I: THE CELLS**

1. **Fibroblasts** are large, long, flat, branching cells with large light colored nuclei. Fibroblasts are the most abundant cells in connective tissue proper. They are responsible for production and maintenance of fibers and ground substance.

### **Fibroblast Drawing**



2. Examine the picture of fibroblasts on the laminated cards and, using your colored pencils, draw a fibroblast in the box at the right.

3. **Macrophages** are active phagocytes ("cell eaters"). The term macrophage is descriptive (*macro* means large and *phage* means to eat). So, the term macrophage means "big eater." Macrophages have an oval to irregular shape and have a small nucleus. In cases of inflammation, macrophages detach from fibers, change their shape to resemble an amoeba, and begin actively moving about the body. In the mobile state, macrophages are scavengers that engulf and destroy foreign material and damaged cells.

### **Macrophage Drawing**



4. Examine the picture of macrophages on the laminated cards and, using your colored pencils, draw a macrophage in the box at the right.

5. **Fat cells**, also called **adipose cells**, synthesize and store fats. A mature adipose cell accumulates so much fat that the nucleus and cytoplasm are pushed to the sides of the cell.

### **Adipose Cell Drawing**



6. Examine the picture of adipose cells on the laminated cards and, using your colored pencils, draw an adipose cell in the box at the right.

7. **Mast cells** are relatively large cells with irregular shapes and small pale nuclei. They are often found near blood vessels. Their cytoplasm is crowded with dark staining secretory granules. These granules contain heparin (a compound that prevents blood from clotting as it circulates throughout the body) and histamine (a compound that initiates the inflammatory response and allergic reactions).

**Mast Cell Drawing**

8. Examine the picture of mast cells on the laminated cards and, using your colored pencils, draw a mast cell in the box at the right.

9. **Plasma cells** are a specific type of white blood cell. Plasma cells are oval-shaped and have a large, dark nucleus located off center. They are the main producers of antibodies that help defend the body against infection and cancer.

**Plasma Cell Drawing**

10. Examine the picture of plasma cells on the laminated cards and, using your colored pencils, draw a plasma cell in the box at the right.

11. Identify each of the cells picture on the Connective Tissue – Cell Identification card. Use the key below to indicate your answers.

A = Adipose  
F = Fibroblast  
P = Plasma cell

Ma = Macrophage  
Ms = Mast cell

\_\_\_\_\_ Cell #1

\_\_\_\_\_ Cell #2

\_\_\_\_\_ Cell #3

\_\_\_\_\_ Cell #4

\_\_\_\_\_ Cell #5

\_\_\_\_\_ Cell #6

\_\_\_\_\_ Cell #7

\_\_\_\_\_ Cell #8

\_\_\_\_\_ Cell #9

12. Identify the connective tissue cell described in each of the following. Use the key below to indicate your answers.

A = Adipose  
F = Fibroblast  
P = Plasma cell

Ma = Macrophage  
Ms = Mast cell

- \_\_\_\_\_ Oval-shaped cell with a large, dark nucleus located off center
- \_\_\_\_\_ Irregular shaped cells with small pale nuclei and cytoplasm crowded with dark staining secretory granules
- \_\_\_\_\_ Large round shaped cells with the nucleus and cytoplasm pushed to the margin of the cell
- \_\_\_\_\_ Oval to irregular shaped cells with small nuclei
- \_\_\_\_\_ Large, long, flat, branching cells with large, light colored nuclei
- \_\_\_\_\_ Most abundant cells in connective tissue
- \_\_\_\_\_ Responsible for production and maintenance of fibers and ground substance
- \_\_\_\_\_ Active phagocytes
- \_\_\_\_\_ Big eaters
- \_\_\_\_\_ Engulf and destroy damaged cells and pathogens
- \_\_\_\_\_ Synthesize and store fat
- \_\_\_\_\_ Contain heparin and histamine
- \_\_\_\_\_ Store and release a compound that prevents blood from clotting as it flow throughout the body
- \_\_\_\_\_ Store and release a compound that initiates the inflammatory response and allergic reactions
- \_\_\_\_\_ Main producers of antibodies
- \_\_\_\_\_ Produce a compound that helps fight infection, pathogens, and cancer

## **PART II: THE FIBERS**

13. **Collagen (collagenous) fibers** are composed of the protein collagen. These fibers are thick, sturdy, strong, flexible, and unstretchable. They are the most common type of fiber found in connective tissue. They appear blue or pink when stained.

### **Collagen Fibers Drawing**

14. Examine the collagen fibers on the laminated cards and, using your colored pencils, draw the collagen fibers in the box at the right.

15. **Elastic fibers** are composed of the protein elastin. These fibers stretch easily and appear wavy, curly, and black.

### **Elastic Fibers Drawing**

16. Examine the elastic fibers on the laminated cards and, using your colored pencils, draw the elastic fibers in the box at the right.

17. **Reticular fibers** are the least common of the fibers found in connective tissue. These thin fibers form a branching, interwoven framework within organs that provides support for the tissues in the organ.

### **Reticular Fibers Drawing**

18. Examine the reticular fibers on the laminated cards and, using your colored pencils, draw the reticular fibers in the box at the right.

19. Identify the fiber describe in each of the following. Use the key below to indicate your answers.

C = Collagen fibers

E = Elastic fibers

R = Reticular fibers

\_\_\_\_\_ Composed of elastin

\_\_\_\_\_ Composed of collagen

\_\_\_\_\_ Thick, sturdy, strong, flexible, unstretchable

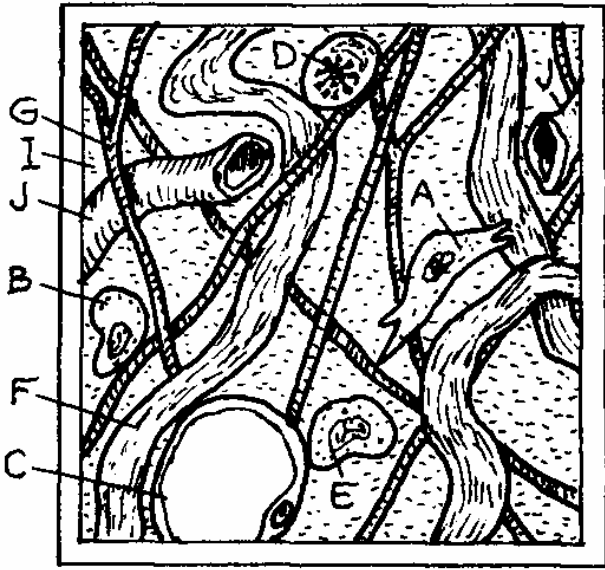
- \_\_\_\_\_ Appear blue or pink when stained
- \_\_\_\_\_ Wavy, curly, black fibers
- \_\_\_\_\_ Thin fibers that form a branching, interwoven framework within organs
- \_\_\_\_\_ Stretchable
- \_\_\_\_\_ Provide support

### **PART III: THE CONNECTIVE TISSUES**

20. **Loose (Areolar) Connective Tissue** – Color the diagram and use your textbook (p. 91) to provide the locations and functions of loose connective tissue. **Note: Use this key and the same colors to color the diagrams in 20, 21, and 22.**

- ☐ Fibroblasts (A)
- ☐ Macrophage (B)
- ☐ Adipose cell (C)
- ☐ Plasma cell (D)
- ☐ Mast cell (E)

- ☐ Collagen fiber (F)
- ☐ Elastic fiber (G)
- ☐ Reticular fiber (H)
- ☐ Matrix (I)
- ☐ Capillary (J)

| <b>Loose (Areolar) Connective Tissue</b>  |                   |
|---|-------------------|
|  | <b>Locations:</b> |
|   | <b>Functions:</b> |

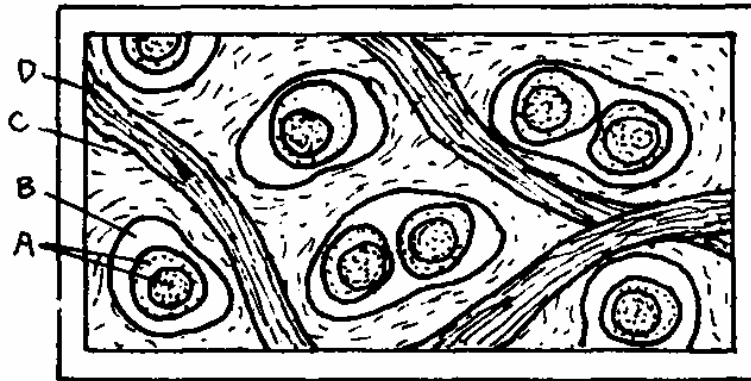


23. **Hyaline Cartilage** – Color the diagram and use your textbook (p. 94) to provide the locations and functions of loose connective tissue. **Note: Use this key and the same colors to color the diagrams in 23, 24, and 25.**

- ☐ Chondrocytes (A)  
☐ Lacuna (B)  
☐ Matrix (C)

- ☐ Collagen fiber (D)  
☐ Elastic fiber (E)

### Hyaline Cartilage




Locations:

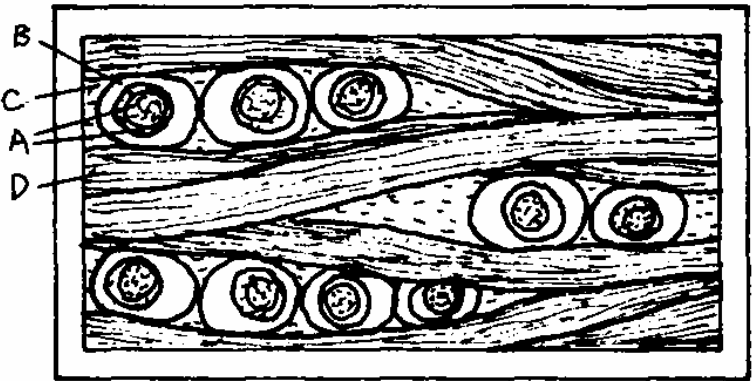
Functions:



24. **Elastic Cartilage** – Color the diagram and use your textbook (p. 94) to provide the locations and functions of loose connective tissue. **Note: Use this key and the same colors from #23.**

|   |                   |
|---|-------------------|
| <b>Elastic Cartilage</b>  |                   |
|  <p>The diagram shows a cross-section of elastic cartilage. It features numerous chondrocytes, which are cells with a central nucleus and a surrounding clear area (cytoplasm). These cells are embedded in a dense matrix of elastic fibers, which are represented by thick, wavy, dark lines. Labels A, B, C, and D point to specific structures: A points to a chondrocyte, B points to the matrix, C points to an elastic fiber, and D points to another chondrocyte.</p> |                   |
| <b>Locations:</b>   | <b>Functions:</b> |
|   |                   |

25. **Fibrocartilage** – Color the diagram and use your textbook (p. 94) to provide the locations and functions of loose connective tissue. **Note: Use this key and the same colors from #23.**

|  |                   |
|--|-------------------|
| <b>Fibrocartilage</b>  |                   |
|  <p>The diagram shows a cross-section of fibrocartilage. It features chondrocytes, which are cells with a central nucleus and a surrounding clear area (cytoplasm). These cells are embedded in a dense matrix of collagen fibers, which are represented by thick, wavy, dark lines. Labels A, B, C, and D point to specific structures: A points to a chondrocyte, B points to the matrix, C points to a collagen fiber, and D points to another chondrocyte.</p> |                   |
| <b>Locations:</b>  | <b>Functions:</b> |
|  |                   |

26. Identify the type of connective tissue pictured on the Connective Tissue Cards pages 6 and 7. Use the key below to indicate your answers.

A = Adipose  
L = Loose

D = Dense

\_\_\_\_\_ Tissue #1

\_\_\_\_\_ Tissue #2

\_\_\_\_\_ Tissue #3

\_\_\_\_\_ Tissue #4

\_\_\_\_\_ Tissue #5

\_\_\_\_\_ Tissue #6

\_\_\_\_\_ Tissue #7

\_\_\_\_\_ Tissue #8

27. Identify the type of cartilage pictures on the Connective Tissue Cards page 8. Use the key below to indicate your answers.

E = Elastic  
H = Hyaline

F = Fibrocartilage

\_\_\_\_\_ Tissue #9

\_\_\_\_\_ Tissue #10

\_\_\_\_\_ Tissue #11

\_\_\_\_\_ Tissue #12

\_\_\_\_\_ Tissue #13

\_\_\_\_\_ Tissue #14

28. Identify the connective tissue described in each of the following. Use the key below to indicate your answers.

A = Adipose  
L = Loose

D = Dense

\_\_\_\_\_ Located beneath the dermis of the skin, digestive, respiratory, and urinary tracts; between muscles; around blood vessels, nerves, and around joints

\_\_\_\_\_ Cushions organs; provides support but permits independent movement; Phagocytic cells provide defense against pathogens

\_\_\_\_\_ Located beneath the skin, especially at the sides, buttocks, breasts, behind the eyeballs and around the kidneys

\_\_\_\_\_ Provides padding and cushions shocks; insulates; stores energy reserves

\_\_\_\_\_ Located between skeletal muscles and the skeleton; between bones; forms the covering of skeletal muscles and the capsules of visceral organs

\_\_\_\_\_ Provides a firm attachment; conducts pull of muscles; reduces friction between muscles; stabilizes relative positions of bones; helps prevent over expansion of organs such as the urinary bladder

29. Identify the cartilage described in each of the following. Use the key below to indicate your answers.

E = Elastic  
H = Hyaline

F = Fibrocartilage

- \_\_\_\_\_ Resists compression; prevents bone-to-bone contact; limits relative movement
- \_\_\_\_\_ Provides support, but tolerates distortion without damage and returns to original shape
- \_\_\_\_\_ Provides stiff but somewhat flexible support; reduces friction between bony surfaces
- \_\_\_\_\_ Between tips of ribs and bones of sternum; covering bone surfaces at synovial joints; supporting larynx (voice box), trachea, and bronchi; forms part of nasal septum
- \_\_\_\_\_ Intervertebral discs separating vertebrae along spinal column; pads within knee joint; between pubic bones in pelvis
- \_\_\_\_\_ Pinna of external ear; auditory canal; epiglottis

#### **PART IV: MEMBRANES**

30. Read pp. 95 – 97 in your textbook. Identify the type of membrane described in each of the following. Use the key below to indicate your answers.

C = Cutaneous membranes  
M = Mucous membranes

Se = Serous membranes  
Sy = Synovial membranes

- \_\_\_\_\_ Line cavities and communicate with exterior
- \_\_\_\_\_ Includes lining of respiratory, digestive, urinary, and reproductive tracts
- \_\_\_\_\_ Surface kept moist usually from mucous secretions
- \_\_\_\_\_ Consists of simple columnar, stratified squamous, or transitional epithelium and loose connective tissue
- \_\_\_\_\_ Line sealed, internal body cavities
- \_\_\_\_\_ Consists of simple epithelium and loose connective tissue
- \_\_\_\_\_ Includes the pleura, peritoneum, and pericardium
- \_\_\_\_\_ One portion covers internal organs (visceral) and the other portion lines the outer wall of the chamber (parietal)
- \_\_\_\_\_ Covers body surfaces
- \_\_\_\_\_ Skin

- \_\_\_\_\_ Consists of stratified squamous epithelium and loose connective tissue
- \_\_\_\_\_ Thick, water proof, and usually dry
- \_\_\_\_\_ Found in synovial joints
- \_\_\_\_\_ Secretes a viscous fluid that lubricates joints and decreases friction
- \_\_\_\_\_ Consists of loose connective tissue and an incomplete layer of epithelium